SURGICAL INSTRUMENTS

Dr. Mohamed El Matary
Lecturer of general surgery
Faculty of Medicine
Ain Shams University

Published 2006

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Allah the all merciful,
I beg Thee
To accept this effort
For the soul of my mother
She was your gift for me

ACKNOWLEDGEMENT

The author wishes to acknowledge with gratitude all those who have helped in the preparation and production of this book & who have contributed their suggestions and ideas for the new book.

Special thanks to:

Dr. Ahmed Mahmoud Abd El Salam,

Ain Shams, for his help and advice on preparation, edition, computerization & printing of the 1st edition.

Author

April, 2006

This book provides an update for medical students who need to keep abreast of recent developments. I hope also it will be useful for those preparing for postgraduate examination.

This book is designed to provide a concise summary of surgical instruments, which medical students and others can use as study guide by itself or with readings in current textbooks, monographs, and reviews.

The author is extremely grateful to all the contributors for the high standard of the new chapters, and hopes that you, the reader, will enjoy going through these pages as much as he had.

M. El-Matary

GENERAL INSTRUMENTS

Scalpel

Other names:
Surgeon's knife

Description:
- Handle (reusable)
- Detachable blade (disposable)
- Made of metal

Sizes:
- Different sizes
- Known by numbers

Sterilization:
- Boiling
- Autoclave

Uses:
- The usual blades used in surgery are #10 or #20
- Blade #11 is used in abscess drainage
- Blade #15 is used for vascular & plastic surgery

How to use?
- Pen grip: used for delicate work:
  - ◊ Hold the handle between the thumb and the middle and the ring fingers
  - ◊ Put the index on the back of the blade for better control of pressure & movement.
- Table knife grip: used to divide skin and cut through layers for abscess.

Criteria of ideal scalpel:
- Light
- Balanced body
- Sharp blade.


blades


handle

Non-toothed dissecting forceps

Description:

- Two handles attached at their ends.
- The tip is either pointed or fenestrated.
- The inner surface of the tip shows transverse serrations, but no teeth
- No joint
- No lock

Sizes:

3 different sizes: small, medium & large.

Sterilization:

- Boiling
- Autoclave

Uses:

- Dissection of delicate structures, e.g. blood vessels, intestine (the fenestrated type)
- Dissection of hernial sac from vessels of spermatic cord.

Toothed dissecting forceps

Description:
Same as non-toothed dissecting forceps but with teeth.

Uses:
Holding tough structures, e.g. skin, subcutaneous tissue, fascia, muscles, aponeurosis…

Sinus forceps

Description:

- Two blades & two handles.
- Attached by a screw or box joint
- No lock
- Serrations are confined to the tip

Uses:

- Holding the walls of abscess cavity for biopsy
- Drainage of abscess by Hilton's method in dangerous areas, by opening the blades in all directions to break the loculi
- Catch dressing of wounds.

Sizes:

Different sizes

Sterilization:

- Boiling
- Autoclave.

Kocher's forceps

Description:

- Like artery forceps with teeth at the tips of the blades
- The teeth fit together when the kocher is closed

Uses:

- Holding & traction on tough structures, e.g. sole of foot, rectus sheath in paramedian incision.
- Crushing the base of the appendix 3 times before incision of appendicectomy
- Clamping vascular bands or omentum.
- Bone surgery
- Radical mastectomy

Artery forceps

Other names:
- Hemostat
- Mosquito forceps (very small artery forceps)

Description:
- Two handles & two blades
- Attached by joint & ratchet (lock).
- May be straight or curved
- No teeth.

Sizes:
- Small (mosquito): mainly in plastic surgery, intestinal anastomosis, circumcision
- Medium (artery)
- Large (arterial clamp): discussed later in details.

Shapes:
- Straight
- Curved.

Sterilization:
- Autoclave
- Boiling

Uses:
- Catch the bleeding point (hemostat).
- Clamping a vessel between two forceps & then dividing in

between the two

- Catch peritoneum or aponeurosis.
- Opening abscess cavity (Hilton's method)
- Dressing.

Curved medium-sized artery forceps

Mosquito

Gland forceps

Description:

- Two handles & two blades.
- The tip of each blade ends by a ring.
- The main axis of the ring forms right angle to the shaft.

Sterilization:

Autoclave.

Uses:

- Holding lymph node during lymph node biopsy.
- Holding submandibular salivary gland in sialadenectomy.
- Holding thyroid gland in thyroidectomy (specially in retrosternal goiter)

Ring forceps

Other name:
Ali Ebrahim's forceps

Description:
- Two handles & two blades
- The tips of the blades form a ring.

Sterilization:
- Autoclave
- Boiling

Uses:
- To hold ureter above & below stone during ureterolithotomy
- To hold spermatic cord during hernia surgery.

Lane's forceps

Description:

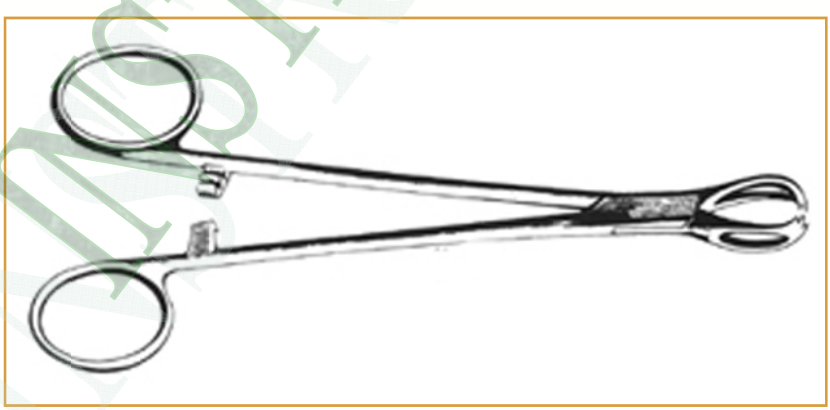
- 2 handles & 2 blades
- Blades are fenestrated
- One blade has a tooth & the other has a groove
- The blades are heavier than babcock's forceps.
- The handles have a lock
- Made of metal.

Sterilization:

- Autoclave
- Boiling

Uses:

- Holding tough structures like skin & fascia**.**
- Holding structures between 2 blades, e.g. spermatic cord or ureter, but ring forceps is preferred.



Sargeant's scalp forceps

Description:

- 2 handles & 2 toothed blades
- It has a lock

Uses:

Was used in the past to control the bleeding of the scalp

Complications:

Pressure necrosis of the scalp

Sponge holding forceps

Description:

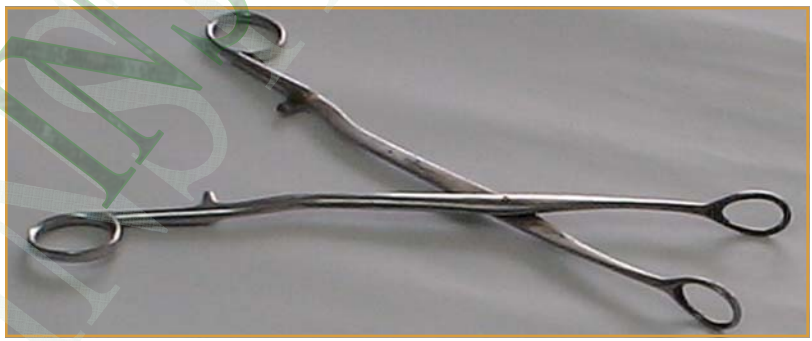
- 2 handles & 2 blades
- With a joint & a lock
- The operating end is oval, fenestrated with fine serrations
- The main axis of the blade is in line with the shaft
- Made of metal

Sterilization:

- Boiling
- Autoclave

Uses:

- To hold pieces of gauze for cleaning of the skin
- Cleaning the depth of operative field from blood
- For dressing of wounds
- As a retractor



Handling forceps

Description:
- 2 handles and 2 blades
- The distal end is curved
- No lock
- Made of metal

Sterilization
- Autoclave
- Boiling
- Antiseptic solutions

Uses:
Holding sterile instrument, towels & dressings by nurses

NB:
- There are 2 different shapes
- It is not placed over the table of instruments, but the blades are kept immersed in a jar of antiseptic solution

Tongue holding forceps

Description

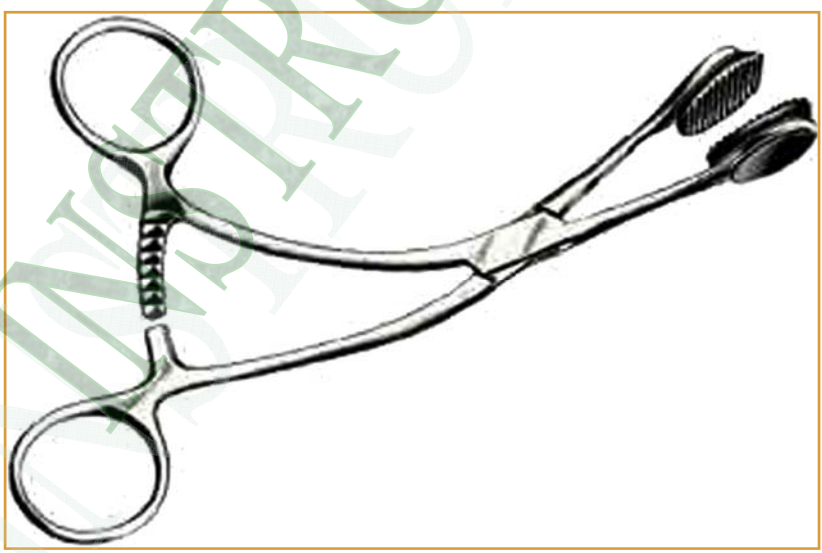
- 2 handles and 2 blades.
- The instrument is curved.
- It has a lock.
- There is oval fenestration at the operating end.
- The oval piece of serrated red rubber is plugged in each fenestration.

Sterilization:

- Boiling.
- Autoclave.

Uses:

To hold the tongue.



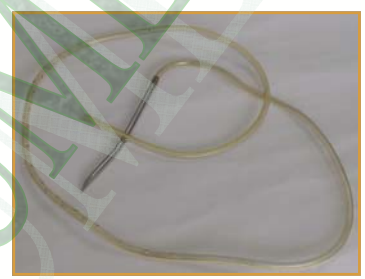
Portovac

Other names:
- Suction drainage apparatus
- Vacuum drain

Sterilization:
Irradiation

Uses:
- Suction drainage after certain operations as:
- Thyroidectomy
- Cholecystectomy
- Splenectomy
- Biliary & urinary tracts operations

Advantages:
- Closed system, creating negative pressure with no need for a suction machine.
- It is more effective and less liable to produce infection than the corrugated rubber drain.



Corrugated rubber drains

Description:
Corrugated sheets of red rubber &/or plastic

Sterilization:
- Boiling
- Irradiation
- antiseptic solution

Uses:
- Drainge of pus from abscesses
- After certain operations like thyroidectomy, cholecystectomy, UT operations, appendicectomy…
- After laparotomy (for peritonitis) to prevent residual abscess in the postoperative period

Technique:
The drain is put at the site of operation, brought out through a separate stab wound and fixed to the skin by a stitch.

Care for drain:
Daily dressing

Removal:
It should be removed after it stops draining. Usually it takes about 3-5 days, but 7 days after resection anastomosis. It may be shortened before removal if it is inserted far away from its exit.

Complications:

- Infection and pressure necrosis especially if the drain is left longer than necessary.
- Bleeding from the exit wound.
- Incisional hernia if the drain is brought out through the primary incision.
- Loss of the drain inside the drained cavity.

NB:

- Corrugations create spaces, which help drainage.
- Insertion of a drain after thyroidectomy and modified radical mastectomy is mandatory.
- No drainage after appendicectomy except if it is complicated and no drainage after herniorrhaphy except if it is strangulated.

Abdominal tube drains

Description:

- made up of silicon rubber or plastic
- It has side as well as end holes. These are connected to bags, thus forming a closed system, reducing the possibility of infection tracking back into the tissues.

Thoracic tube

Description:

Plastic or rubber tubes of suitable size passed through a cannula into the pleural cavity and are connected to under-water seal closed system.

Uses:

Drainage of the pleural cavity in cases of pneumo or hemothorax.

Underwater seal drainage:

- Insertion of a chest drain is indicated when there is air or fluid in the pleural cavity.
- The site of insertion is in the "triangle of safety", which is bounded by the anterior border of latissimus dorsi, the posterior border of pectoralis major and the superior border of the 5th rib (or the midaxillary line, anterior axillary line and the 5th rib).
- Under local infiltration anesthesia, an incision is made in the skin and subcutaneous tissues sufficient to admit a finger easily.
- The intercostal muscles are separated by an artery forceps and the pleura is punctured and the intercostal drainage tube is inserted.
- A wide bore tube (>28 Fr) is used for the drainage of blood and fluids, whereas a smaller bore tube may be used for the removal of air.

Needle holder

Description:
- 2 Handles and 2 blades.
- The handles are much longer than the blades.
- It has a lock.
- Serrations at the tips in both directions prevent slipping of needles.

Types:
- Straight.
- Curved.
- With scissors.

The varieties in use are:
- Mayo needle holder.
- Gillies needle holder.
- Naughton-Morgan needle holder.
- Kilner needle holder.
- Microvascular needle holder.

Sizes:
- Different sizes according to the size of the needles.
- Fine needle holders are damaged by large needles.
- Small needles are damaged by large needle holders.

Uses:
- To hold the curved needles.
- Straight types are used in superficial sutures.
- Curved types are used in deep sutures.
- In plastic surgery, a fine needle holder is used, which can cut as scissors at the same time.

How to hold the needle?

Just behind the midpoint for maximum advantage in curving action.

Intravenous cannula

- A cannula is used when prolonged aspiration or injection into a duct or cavity is necessary.
- It may be inserted through the needle lumen or may be outside the needle and inserted within it.
- In either case, the needle is then removed.

Mickel's clip apparatus

Description:

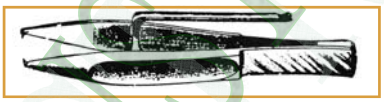
- Made of metal strips
- A spike at each end
- It is made of three parts:
  - ◊ Carrier forceps
  - ◊ Applicating forceps
  - ◊ Extracting forceps

Uses:

Skin closure, especially in the neck, because they leave a minimal scar

Carrier forceps:

- Similar to toothed dissecting forceps
- Provided with a magazine for the clips



Applicating forceps:

Similar to dissecting forceps with a groove at the tip for holding the clip

Extracting forceps:

Description:

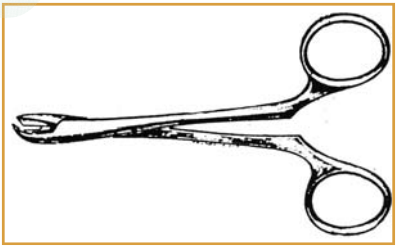
- Two fitting blades, one is convex & the other is concave
- No lock

Uses:

Used in extracting clips

How to use?

- The concave blade is placed behind the bend of the clip
- The two blades are closed, so this will straighten the clip and then remove it



Towel clips

Description:

- 2 handles and 2 blades with a joint and a rachet (lock).
- Blades are bi-convexly-curved, with pointed tips.
- They are of different sizes.

Sterilization:

- Autoclave.
- Boiling.

Uses:

- To hold & fix towels to the skin around the field of operation.
- Can be used to hold the tip of the tongue.

Side curtain towel clips

Description:

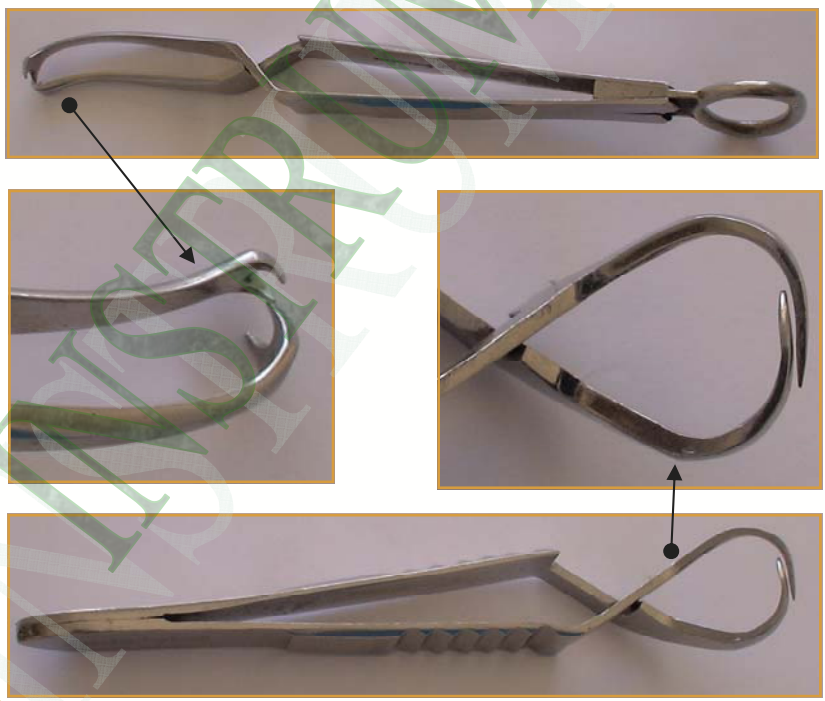
Two handles and 2 blades attached together at special springy joint

Sterilization:

- Boiling
- Autoclave

Uses:

To hold the side towels to the edges of the wound to isolate the skin completely from the operation field in septic operations



Dissector

Description:
A handle & blunt curved blade

Types:
- McDonald dissector
- Durham's dissector
- Watson-Cheyne dissector

Uses:
Used in separation of tissues covering delicate structures (nerves, vessels and tendons)

Butterfly needle

Description:

- Fine needle attached to a short plastic tube.
- The needle has wings for fixation.

Uses:

Venous access in children.

Diathermy forceps

Description:

- Like non-toothed dissecting forceps but both ends are pointed
- Modern types are electrically isolated

Uses:

For electrocautary, to control bleeding

Scissors

Mayo's scissors

Description:

- Normal scissors, no lock, small size.
- May be straight or curved.

Sterilization:

- Autoclave
- Boiling makes the blade blunt, so it is not used.

Uses:

Dissection of less delicate tissues.

Metzenbaum's dissecting scissors

Description:

- Rounded blunt tip
- May be straight or curved

Uses:

For careful tissue dissection.

Stitch scissors

Description:

With narrow sharp termination.

Uses:

To remove stitches.

Dressing scissors

Other name:

Bandage scissors

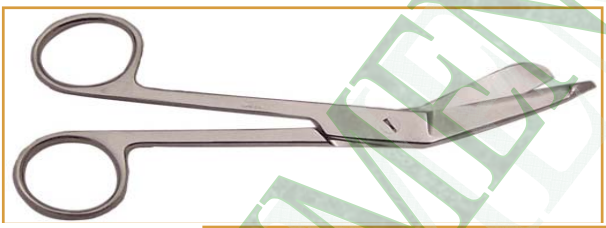
Description:

2 handles & 2 strong straight or curved blades

Uses:

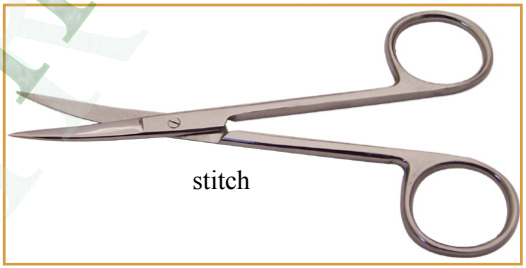
Cutting the dressing & bandages

Mayo



stitch

Metzenbaum's



stitch

microvascular

Curettage spoon

Description:

- A handle in the middle
- 2 curved grooved blades of different sizes on either side
- Some types have only one blade

Uses:

- To curette sinuses like pilonidal sinuses & perianal sinuses
- To scrap cavities & granulation tissues

Sterilization:

- Autoclave
- Boiling

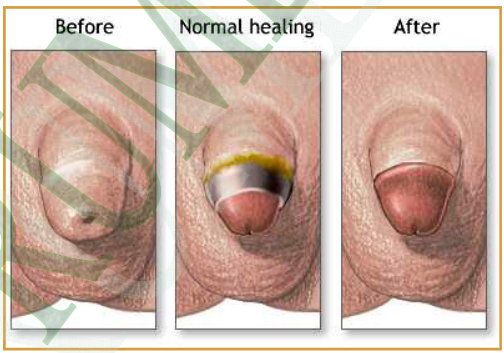
Plastibell device

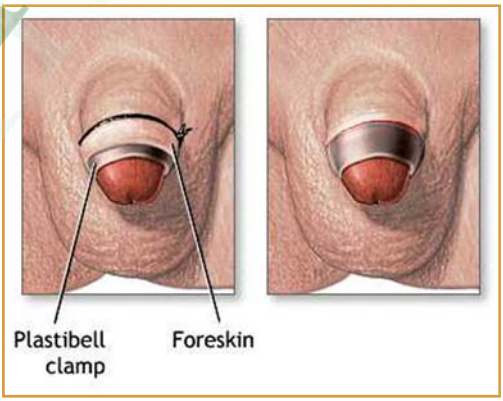
Description:
Conical plastic device with a ridge at the handle side.

Sizes:
Three sizes; 11, 13 and 15 mm diameter.

Uses:
circumcision in infants

Technique:
- A 1-cm dorsal incision is made in the prepuce, which is then freed and retracted.
- The bell of suitable size is then placed over the glans and the foreskin is drawn forwards over it.
- A firm linen ligature is tied on the ridge of the plastibell and the redundant foreskin is cut away.
- The handle is broken off and the Plastibell remains as a protective collar over the glans.
- No dressing is required after the procedure. The ring separates between 5 and 8 days postoperatively.





RETRACTORS

Volkmann's retractor

Description:
- Long handle.
- Toothed blade.
- Non-self retaining.

Sterilization:
- Boiling.
- Autoclave.

Uses:
Retraction of the skin.

Langenbeck's retractor

Description:

- Long handle
- Curved blade
- Non-self retaining

Uses:

To retract skin and muscles during the operations of appendicectomy, thyroidectomy, herniorrhaphy and uretrolithotomy

Fenestrated Durham's retractor

Description:

- Long handle
- Fenestrated curved blade
- Non-self retaining

Uses:

Retraction of muscles during herniorrhaphy, appendicectomy & thyroidectomy operations

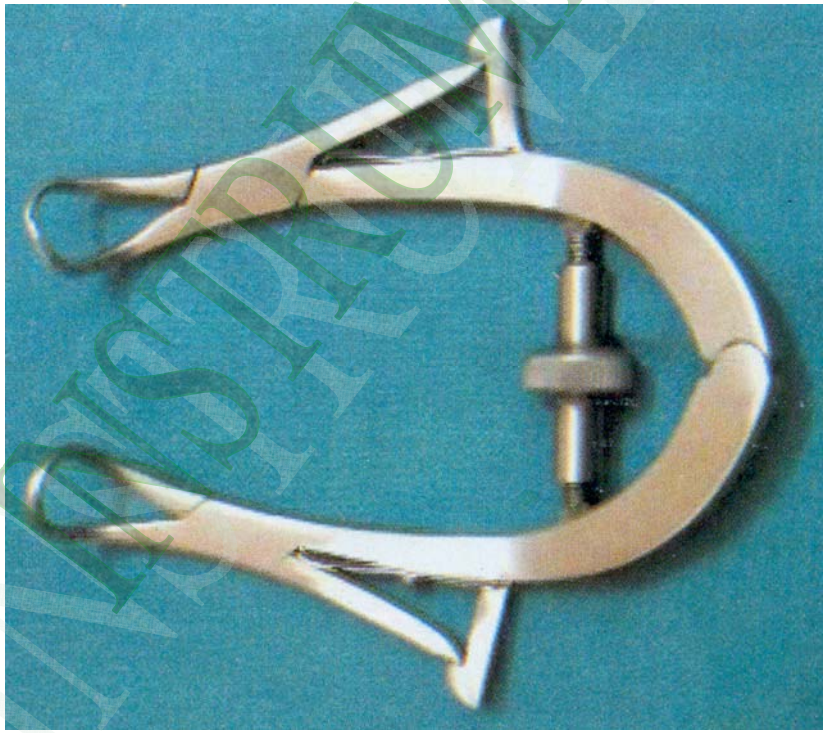
Cecil-joll thyroid retractor

Description:

- 2 handles and 2 blades attached together by a special joint
- The 2 blades have special joints
- It is self retaining

Uses:

Mainly in thyroid operation to retract flaps of the skin upwards and downwards



Morris' retractor

Description:

- Long handle
- Long curved blades
- Broad operating end
- Non-self retaining

Uses:

Retraction of large abdominal wound during laparotomy, cholecystectomy, splenectomy, renal & ureteric operations & pelvic operations

Kelly's retractor

Description:

- Long handle and curved blades.
- Non-self retaining.

Uses:

Retraction of muscles in deep abdominal & pelvic operations like cholecystectomy, splenectomy, colonic and gastric operations, pelvic and renal operations.

Segond retractor

The same as Kelley.

Self-retaining retractors

Description:
2 handles and 2 blades attached by special joint

Types:
- Collin retractor
- Gassot retractor
- Alfour retractor

Uses:
In large abdominal surgeries

Advantages of self-retaining retractors:
- They allow the assistant to do other jobs during the operation
- The amount of traction can be adjusted by changing the position of the blades in the frames
- The traction applied in uniform unlike the human hand and traction tiredness does not occur

Collin's retractor

Farabeuf retractor

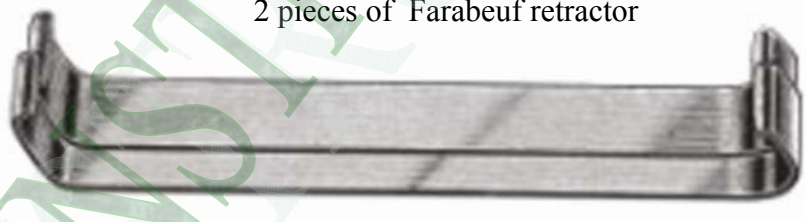
Description:

- Curved handle for easy handling
- Curved blade
- Non-self retaining

Use:

Abdominal wall retractor

2 pieces of Farabeuf retractor



Skin hook retractor

Description:

- 2 handles and 2 blades attached by special joint
- Each blade has a hook
- Self-retaining

Use:

Skin retraction

Blunt pointed hook retractor

Description:

- Long handle.
- Blade ending by a hook, which is blunt.

Uses:

Retraction of nerves, vessels and tendons

Deaver's retractor

Description:
Long handle, blade & curved operating end.

Uses:
Retraction of the liver during vagotomy, cholecystectomy & gastrectomy.

Lung retractor

Description:
- Bulky handle
- Very light blade

Sterilization:
- Autoclave
- Boiling

Uses:
Retraction of the lung during thoracic surgeries:
- Cardiac operations
- Lung operations
- Oesophageal operations
- Tracheal operations

Millen's self retaining retractor

Uses:

- In the operation of retropubic prostatectomy
- The middle blade retracts the UB downwards & helps in exposure of the prostate

Thomson-walker self retaining bladder retractor

Uses:

- In the operation of transvesical prostatectomy
- The middle blade helps in exposure of the prostate by retraction of the UB
- It also facilitates the excision of a wedge from the posterior margin of the bladder neck

GIT INSTRUMENTS

Appendicular or intestinal holding forceps

Other name:
Ringed non-toothed forceps

Description:
Variant of non-toothed forceps with oval or triangular fenestrated termination

Uses:
Holding appendix or intestine.

Allis forceps

Description:

- Two handles & two blades
- Blades have very fine interlocking teeth & meet only at the tip
- There is elongated cavity between the blades
- There is a lock
- Made of metal

Uses:

- To hold delicate structures like intestine, tendon, urinary bladder, mesoappendix & skin.
- To hold the duodenum for duodenal closure during gastrectomy.

Sterilization:

- Autoclave
- Boiling

Babcock's tissue forceps

Description:

- 2 handles & 2 blades
- The blades are gentle
- Blades have serrations, with no teeth.
- There is an opening on the sides of the blades → lighter blades.
- Made of metal.

Sterilization:

- Autoclave.
- Boiling.

Uses:

- Holding intestine, appendix & other delicate structures.
- It can be used in the following operations:
  - ◊ Appendicectomy
  - ◊ Gasterectomy
  - ◊ Resection of intestines.

Anoscope & proctoscope

Description:

- Anoscope is 5 - 7.5 cm long grooved instrument
- Proctoscope is 7.5 – 10 cm long
- They have an outer sheath with a handle & inner blunt part called the obturator

How to use?

Introduce the whole instrument into the anal canal, then withdraw the obturator

Sterilization:

- Irradiation
- Boiling
- Disposable instruments are available

Uses:

- Diagnostic: to inspect the mucosa of the anal canal &/or the rectum for anal lesions like piles, polyps, anal masses & to take biopsies
- Therapeutic: to inject 1st and 2nd degree piles, to excise anal polyps & to inject therapeutic drugs

Sigmoidoscope

Description:

- 25 – 30 cm long
- It may has a light source
- It has an outer sheath and inner blunt part
- The outer sheath is graduated
- It is provided by diathermy

How to use?

The same as anoscope and proctoscope, but may be introduced under general anesthesia

Sterilization:

- Irradiation
- Boiling
- Disposable instruments are available

Uses:

- To diagnose lesions of the rectum & lower part of the sigmoid colon
- To take biopsies
- Polypi are removed by the diathermy snare

Ryle's tube

Other name:
Nasogastric tube

Description:
- 120 cm long tube, with different diameters
- Multiple openings at the tip
- The tip is blunt & closed
- It is graduated
- It has a funnel at the proximal end
- Its tip contains radioopaque substance
- It is made of rubber & transparent protex

Marking:
- When the tip enters the stomach (40 cm)
- When the tip arches the antrum (50 cm)
- Entry into the pylorus (57 cm)
- Entry into the duodenum (65 cm)

Sterilization:
- Irradiation
- Boiling

Uses:
- Decompression as in:
  - ◊ Intestinal obstruction
  - ◊ Acute gastric dilatation (life saving)
  - ◊ Acute pancreatitis.
  - ◊ Perforated duodenal ulcer
  - ◊ Prior to major operations: It is not necessary unless it is clearly indicated.
- Feeding of patients, who cannot eat, but has a functioning bowel (coma and tetanus)
- Lavage: The Ewald tube is used for gastric lavage to remove clots in gastric bleeding. It is a large tube and is often introduced through the mouth because of its size.
- Diagnosis as in:
  - ◊ Upper gastrointestinal bleeding.
  - ◊ Acute gastric volvulus: Vomiting followed by retching, localized abdominal pain and failure to pass a nasogastric tube

is a diagnostic triad for acute gastric volvulus.

◊ Pancreatic pseudocyst: A Ryle tube passed into the stomach may be palpable over the swelling in a thin patient.

◊ Oesophageal atresia: If atresia is present, the tube will not enter the stomach and will curl up in the proximal pouch and perhaps appear in the mouth.

- Treatment
  ◊ Conservative treatment of oesophageal perforation: This should be performed in the early stages after perforation and includes nasogastric drainage, massive antibiotic therapy, intravenous fluids, withdrawal of oral intake and total parenteral nutrition.
  ◊ Oesophagocardiomyotomy.

How to introduce?

- Lubricate the distal 4 inches of the tube with a water-soluble jelly.
- Insert the tube slowly through the nose and into the pharynx. If a gag reflex occurs, withdraw the tube

about one inch and encourage the patient to relax. If obstruction is met with, simply rotate the tube, but never force it. If obstruction persists, try to pass the tube through the other nostril.

- Ask the patient to swallow several times and advance the tube steadily to its desired position.
- Severe gagging and retching indicates that the tube is curling up in the oesophagus.
- Coughing or wheezing attacks during intubation usually indicate that the trachea has been entered by mistake.
- Secure the tube with a tape and avoid a tight curve, which can cause pressure necrosis of the naries.

How to confirm that it is in the GIT?

- It passes easily
- Absence of gaging and retching
- Abscence of coughing, sneezing & cyanosis
- Free return of gastric contents
- Aspiration of gastric contents
- Injection of 10 ml air while listening with the stethoscope placed on the epigastrium to hear a characteristic gurgle

Care of the tube:

- Irrigation with 30 ml of normal saline (or 20 ml of air) every 2 hours.
- Check of intake and output, which is important for electrolyte replacement.
- Good oral hygiene that is essential to avoid inflammation of the parotid gland. This can be achieved by frequent mouth washes and sucking ice chips.
- Mild nasal decongestant can be helpful in preventing otitis. Irritation of the Eustachian tubes in the nasopharynx may lead to their obstruction.

Complications:

- Wrong insertion into the trachea.
- Curling up in the pharynx during insertion.
- Erosions, ulcerations and bleeding in prolonged intubation especially along the lesser curvature.
- Reflux oesophagitis.
- Pressure necrosis of the nares if the tube is tightly curved.

Sengstaken-Blakemore tube

Other name:
Esophageal compression tube

Description:
- 2 additional side tubes applied to the main central tube
- It has 2 inflatable balloons: a gastric balloon; spherical when inflated & an esophageal balloon; tubular when inflated
- Made of red rubber & modern tubes are made of silicon

Sizes:
- Length: 115 cm
- Outer diameter: 2 sizes; 5.3 mm & 6.6 mm
- Balloons: the size of the balloon is written on it in cm^3 (ml)

Uses:
- To stop bleeding esophageal varices
- The spherical gastric balloon is more important than the tubular esophageal balloon because it is blugged into the gastroesophageal junction, which is the commonest site for varices which are more liable for bleeding. Also it is considered as a part of portosystemic disconnection

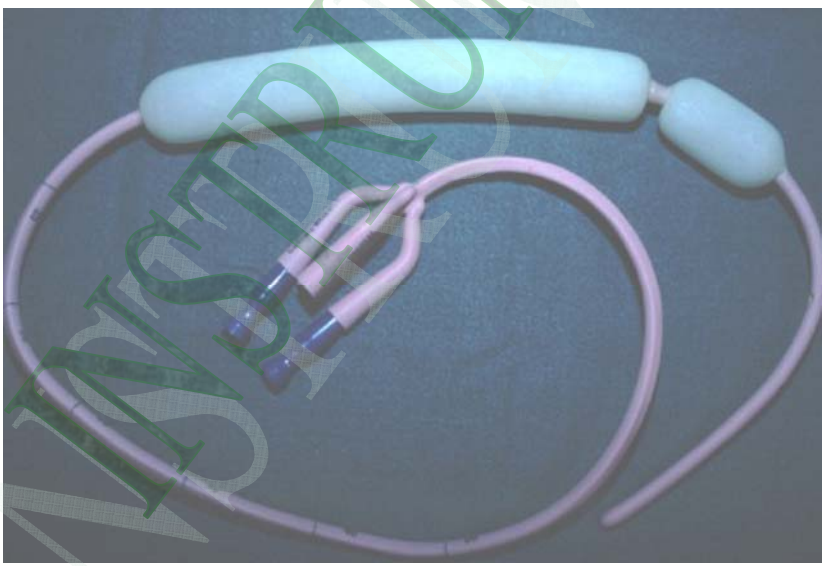
Insertion:
- Examine the tube by inflation outside the GIT
- Sedation with valium
- Spray the pharynx with xylocaine
- Lubricate the tube
- Introduce through the nose into the stomach (50 cm)
- Aspirate the contents
- Inflate the gastric balloon with 250 ml air
- Pull the tube against the cardia & fix it to the cheek
- The esophageal balloon is inflated to a pressure of 30 – 40 mm hg (40 – 60 ml air) to occlude the varices
- The tube should be deflated after 24 hours & left in situ

for another 24 hours

- If bleeding recurs the tube is reinflated & the patient is prepared for urgent injection sclerotherapy or emergency operation

Complications:

- Difficult or false introduction leads to cyanosis & cough
- Pressure necrosis in the ala of the nose
- Discomfort of the patient
- Laryngeal obstruction if the gastric balloon ruptures allowing the esophagus compressing the larynx
- Pressure necrosis in the esophagus → perforation → mediastinitis
- Not as effective as injection sclerotherapy
- Respiratory infections (aspiration pneumonia)



Minnesota tube

Other name:
Modified sengstaken-blakemoore tube

Description:
As sengstaken tube, but with 4 tubes, the 4th is used for suction of esophageal secretions

Uses, insertion & complications:
As sengstaken-blakemoore tube

Linton-Nacchlas tube

Description:

- It is 115 cm length
- Made of silicon
- Double lumen with single balloon tube
- The balloon is large, pear-shaped
- It has x-ray opaque line that allows location & verification of the tube position

Uses:

- Tamponading fundus varices
- The double lumen design allows flushing & aspiration of both the esophagus & the stomach

T-tube

Description:
- Long t-shaped rubber tube
- Short horizontal limb
- Long vertical limb
- Made of latex material, never from plastic, which may be hardened by bile → difficult removal of the tube
- Yellowish in color

Size:
Measured in French scale like urinary catheters

Uses:
- After surgery of the common bile duct
- After ureteric surgery with extraction of uretric stone

Advantages:
- It allows passage of bile, if a narrowing exists in CBD
- It prevents leakage of bile
- It prevents stasis of bile
- Cholangiography by urograffin can be done postoperatively to check its position & to be sure that there is no urographin is left in the duct

When to remove T-tube?
- 10 – 14 days postoperatively
- If there is abdominal pain, jaundice, or pale coloured faeces do not remove it until the patient improves
- If there is no such symptoms clamp the tube and remove it by steady pulling

How to use?
- The short limb is placed in the CBD
- The long limb comes out through the wound

Preparation & insertion:
- There is no need for the short limbs of the T-tube to be longer than 1.5 cm.
- Drainage is improved by removing a gutter from the length of the short limbs, involving one third to half of the circumference of the tube.
- Cutting out A V opposite the long limb facilitates removal of the tube.
- The short horizontal limb is placed vertically within the common bile duct.
- The long limb is brought to the exterior from the most dependent part of the CBD and connected to a sterile container.

Management in the bile duct:
- Bile usually drains freely in the early postoperative days because of oedema in the distal end of the bile duct and spasm of the sphincter, the result of the passage of instruments during operation.
- This temporary obstruction normally subsides during the first week.
- A postoperative cholangiogram is performed between the 8th and the

10th day.

- If the cholangiogram is normal (no filling defects in the bile ducts and free passage of contrast into the duodenum) and if the patient is not jaundiced, the tube may be clamped with a screw clamp for 24 hrs.
- If no pain occurs, the tube can be removed.

Removal:

- The tube may be removed by a steady pull.
- If it cannot be extracted by moderate tension, a haemostat may be applied to the tube, close to the skin, and the patient allowed walking about.
- This often allows the tube to come away.
- After removal of the T-tube there may be a small amount of biliary discharge for the first 24 or 36 hr.

Contraindications to removal:

- Jaundice and fever.
- Pain after clamping.
- Leakage of bile after clamping.
- Abnormal T-tube cholangiogram.

Complications:

- Occlusion: The T-tube may become blocked by blood clot or by biliary mud in the early postoperative period or by encrustation when the tube has been retained for a longer period. Gentle syringe irrigation will usually restore patency.
- Dislodgement: The tube may be pulled out completely or the T-end can be pulled out of the bile duct into the peritoneal cavity with cessation of bile drainage from the tube. Biliary peritonitis may develop or the dressing becomes saturated by copious escape of bile.

Treatment of dislodged T-tube:

- If the tube is dislodged before the 4th day, the abdomen must be reopened, the bile sucked out of the peritoneal cavity and a new T- tube inserted.
- If Dislodgment occurs on or after the 4th day:
  - ◊ If there is evidence of bile peritonitis (fever, tachycardia and abdominal pain), reoperation is performed.
  - ◊ If there is no evidence of bile peritonitis, the patient is carefully observed. The drain and the dislodged tube should be left in situ until drainage subsides.

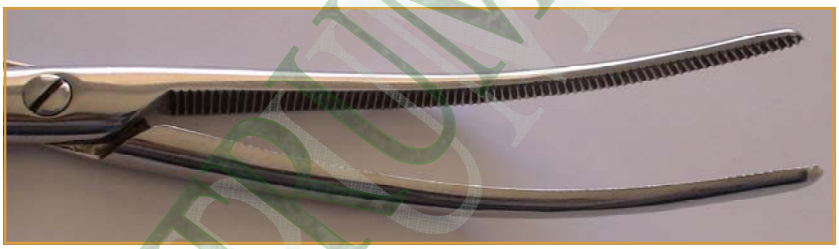
Splenectomy clamp

Description:

- 2 Handles and 2 blades
- The blades are long & curved with obtuse angle

Uses:

As a vascular clamp in splenectomy operation



Non- crushing intestinal clamp

Other names:
Kocher's intestinal clamp

Description:
- 2 handles and 2 blades
- The blades are light, solid fenestrated, straight or curved
- The blades have longitudinal striations
- It has a lock

Uses:
- Occlusion of the viable loops of the intestine or colon in resection anastomosis of the intestine

Advantages of use:
- It occludes the viscous lumen & prevents spillage of the intestinal bowel contents
- It temporarily occludes circulation of the bowel wall and thus keeps the operative field free of blood
- It facilitates anastomosis by allowing the bowel ends to be approximated & manipulated
- It does not interfere with the vascularity of the intestine

Non-crushing gastric clamp

Description:
The same as non-crushing intestinal clamp except:

- Longer blades
- Transverse strictures

Uses:
To be applied on viable stomach during gastric surgery

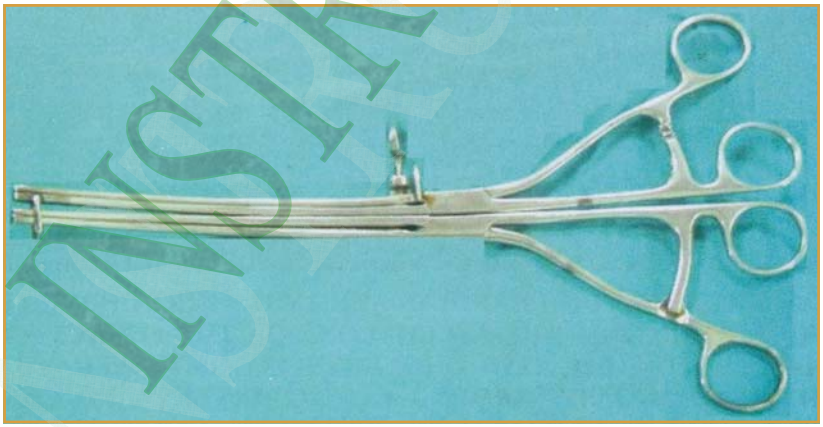
Advantage of use:
As the intestinal clamp

Twin gastro-jejunostomy clamp

Other names:
Lane's clamp

Description:
Two clamps (gastric and intestinal) locked together

Uses:
Gastrointestinal anastomosis, Billroth-I,II, polya & polya-Hoffmeister operations



Payer's crushing intestinal clamp

Description:

- Multi-jointed handles (4 joints)
- 2 long blades
- 2 rough, heavy & strong blades
- There is a catch
- The blades have longitudinal striations
- There are 2 sizes: small & large

Uses:

- To be applied on the non-viable loops of intestine or stomach (the small size)
- It can be applied on the duodenal stump during gastrectomy (the large size)

How to use?

Two instruments are applied on the same loop of non-viable intestine to avoid leakage

They are applied to the segment that is removed from the body

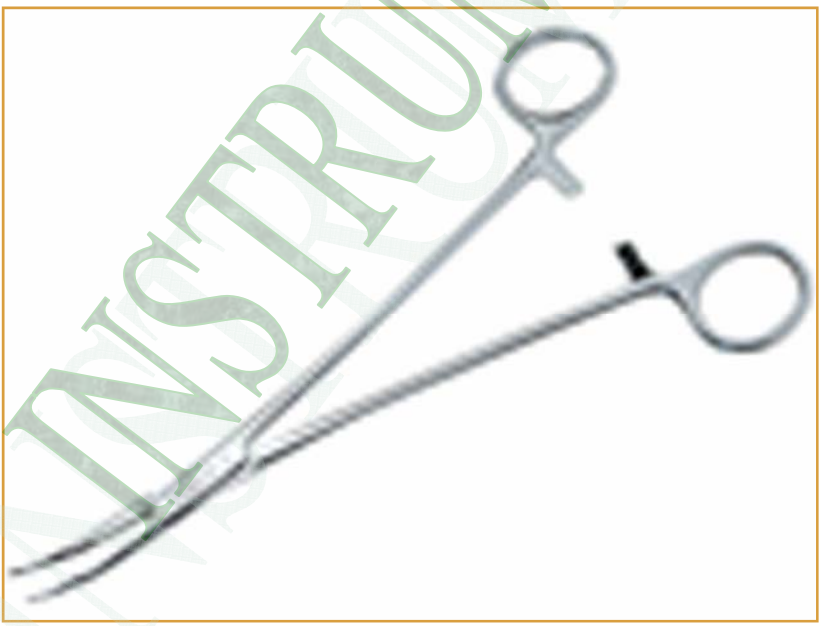
Moynihan's cholecystectomy clamp

Description:

- 2 long handles
- 2 short curved blades, they are shorter and much more curved than a hemostat
- The blades have transverse serrations

Uses:

- 2 instruments are applied, one on the Fundus & one on the Hartmann's pouch during cholecystectomy operation
- It can be used to pass ligature around cystic artery & cystic duct during cholecystectomy



Desjardin's stone forceps

Other names:
- Choledocolithotomy forceps
- Gall duct forceps

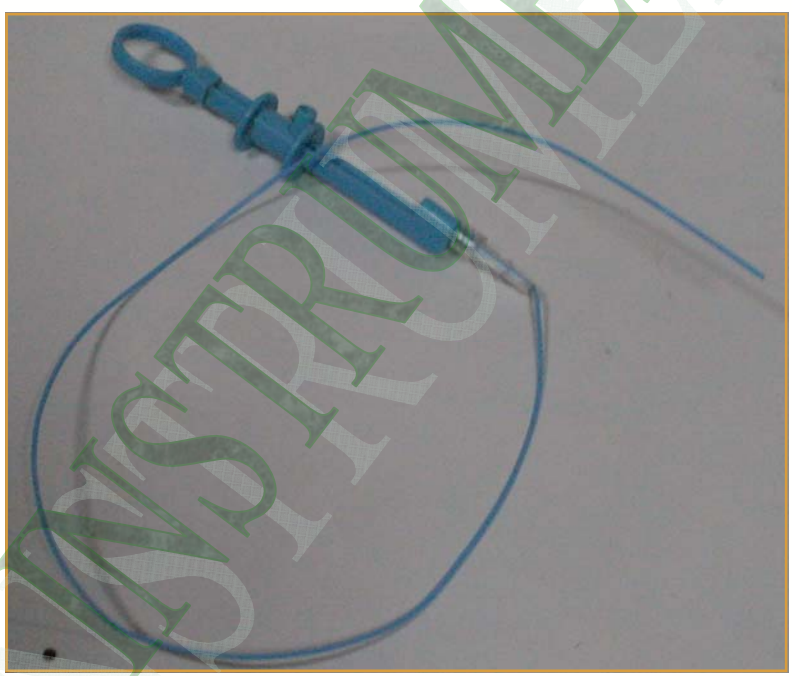
Description:
- 2 long handles
- The blades are curved and the tip broad with fenestrations
- Sometimes the open orifices are closed externally

Uses:
- Removal of stones from the common bile duct
- It can also be used to remove small oval or ureteric stones

Dormia basket

Uses:

Extraction of biliary stones via endoscopic retrograde cholangio-pancreatography (ERCP)



Hernia director

Description:
- Handle & grooved curved blade
- Of different sizes
- Made of metal

Sterilization:
- Autoclave
- Boiling

Uses:
To cut the constriction ring in strangulated hernia: it separates the contents of the hernia from the constricting agent

How to use?
- Put the hernia director between the contents and the constriction ring
- Divide the ring over the groove

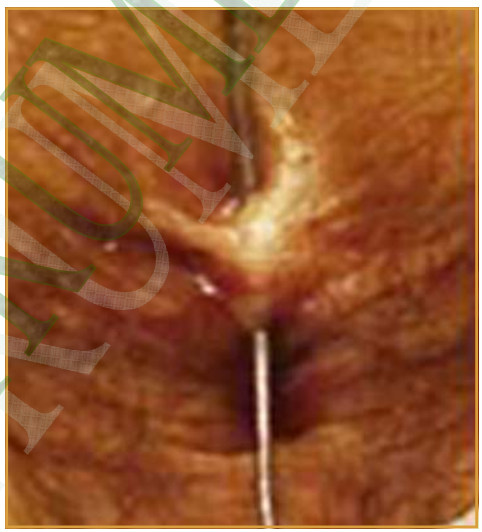
Fistula probe and director

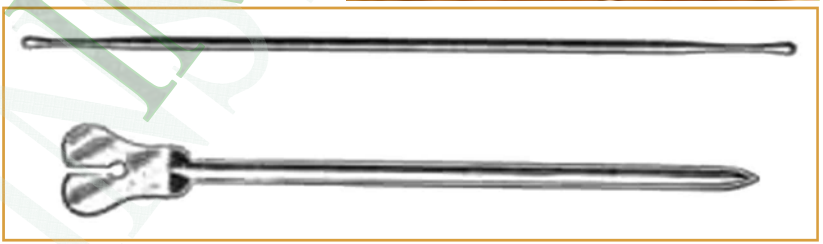
Description:

- Short handle, with butterfly-shaped holding end
- Long grooved pointed blade, with blunt end
- Some probes are graduated for easy measurement of the depth of the fistula
- Some probes are malleable

Uses:

- To probe anal fistula to diagnose the length & direction
- To probe pilonidal sinus or fistula
- To probe any fistula or sinus
- The fistula is laid open by cutting it along the groove of the director
- The butterfly end is used to lift the tongue when cutting frenulum in tongue-tie





Colostomy & ileostomy bag

Description:
A bag made of disposable plastic

Uses:
It is fitted over ileostomies & colostomies to collect the intestinal excreta

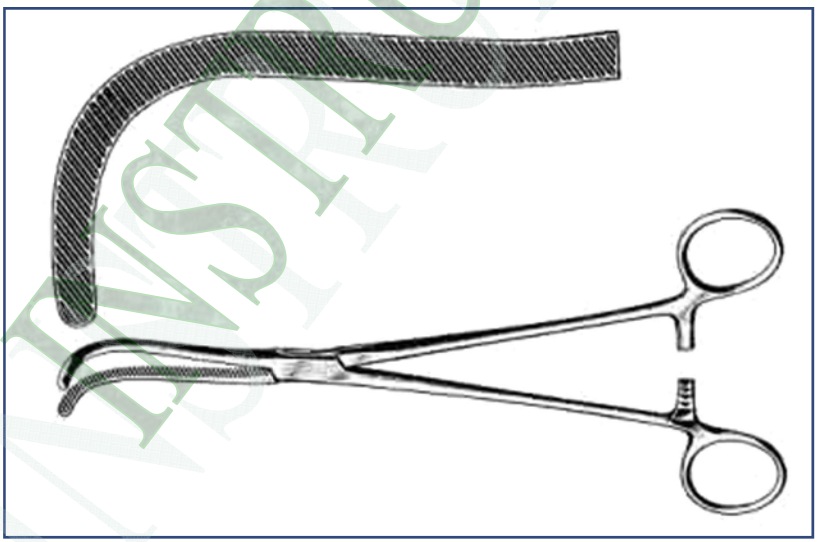
INSTRUMENTS OF UROSURGERY

Renal pedicle clamp

Other name:
Nephrectomy clamp

Description:
- Two handles & two long curved blades, to facilitate its application on the renal pedicle during nephrectomy
- It has a lock
- It has various shapes; some have one or two curves

Uses:
Two or three clamps are applied on the renal pedicle during nephrectomy operation



Catheters

Definition:

Catheters are hollow tubes used to evacuate the urinary bladder.

Catheter sizes:

- Charriere, a notable instrument maker of Paris, calibrated bougies and catheters according to their circumference in millimeters. This became the international system, Charrière or French (Ch or F).
- The French scale is a measure of the external diameter of the catheter, which can be obtained by multiplying the internal diameter in millimeters by 3 (i.e. one French = 0.33 mm internal diameter).
- For safety, nothing more than 14 Ch is needed to drain urine. This gives a room for mucous to escape alongside the catheter.

Snugly fitting catheter:

It gives rise to pressure sores inside the urethra or blocks off the openings of the paraurethral glands, inviting infection and abscess formation. Always use the smallest catheter that will do the job.

Catheterization in males:

1. Lubricate the urethra with a 0.25% chlorhexidine gel containing 1% lignocaine.
2. Complete aseptic precautions should be taken, so that the catheter never touches the patient's skin or that of the surgeon's hands.
3. "Never use any force at all" is the first and last rule in passing a catheter.

4. The penis is gently pulled up to make the urethra straight (at rest, it is folded like a sock).
5. The catheter is advanced until its tip reaches the external sphincter where the patient experiences a discomfort unless the urethra is well anaesthetized.
6. Once passed the external sphincter, the catheter will find its way into the bladder so long as it is flexible and well lubricated.
7. If it is a self retaining catheter, the balloon is inflated with saline according to the capacity written on the catheter

The correct position of the catheter is known by:

- Easy introduction with no bleeding
- The urine comes out
- Sudden loss of resistance

Causes of difficult catheterization:

- Urethral stricture
- Urethral stone
- Senile enlargement of the prostate.

Complications of catheterization:

- False passage
- Bleeding from trauma & injection.

Catheterization in females:

- Follow the rules mentioned above (1, 2 & 3)
- The labia are spread with the index & thumb of one hand to expose the urethral orifice.
- The catheter is introduced and advanced until urine comes out.

Ordinary urinary catheter

Other name:
Jacque's & Harris catheter

Description:
- 30 cm long rubber or plastic colorless catheter
- Solid tip
- One side lateral eye
- The hollow tip permits the use of metal introducer
- It is more stiff than Folley's catheter
- Non-self retaining

Types:
- Plastic
- Red rubber

Sizes:
According to French or English scales

Sterilization:
- Boiling
- Irradiation

Uses:
- Diagnostic:
  - ◊ Retention of urine
  - ◊ Rupture of the urinary bladder
  - ◊ Assessment of the residual volume of urine after voiding
  - ◊ Urodynamic evaluation of the urinary bladder & urethral function
  - ◊ To obtain urine for microscopic study in female when voided urine is markedly vaginally contaminated
- Therapeutic:
  - ◊ Relief of retention of urine
  - ◊ Postoperative after urethral or bladder operation

How to use?
See pages 92 & 93

Contraindications:

Rupture of the urethra

Complications:

- Trauma
- False passage
- Prolonged use leads to urethritis because it contains several irritating antioxidants

How to know the correct position?

- See page 93

Folley's catheter

Description:
- Self-retaining urethral catheter
- Balloon below the tip, inflated with water, the size of the balloon is written in ml at the outer end
- There is a type provided with large balloon, that is used after prostatectomy. It has a hemostatic effect
- There is a variant provided with extra channel to allow bladder irrigation (triple way catheter)
- It has two tubes: urethral tube & balloon tube; with a valve at the outer end

Sizes:
There are two numbers written on the catheter:
- One shows the diameter from 2-26 F (French scale)
- The other shows the capacity of the balloon (10-30 ml)

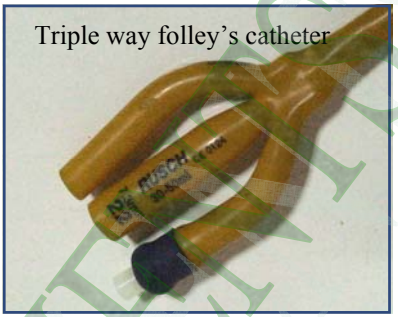
Types:
- Plastic
- Rubber
- Silastic

Sterilization:
- Boiling
- Irradiation

Uses:
- After bladder or urethral operations
- After prostatic surgery: hemostatic effect by the pressure of the balloon
- Bladder wash in urinary tract injuries
- To avoid clot formation & retention
- Drainge of urine in chronic retention, coma, shock or incontinence
- To monitor urine outflow
- Cholecystostomy, gastrostomy, jejunostomy & caecostomy
- Drainge of the peritoneal cavity as in biliary peritonitis

Precautions:
- Before you inflate the balloon, make sure that the catheter is in the urinary bladder, not in the urethra
- Smaller balloons should be used for routine drainge because there is less residual urine & less infection (Small is beautiful = صغيرة وحلوة)
- silicon catheters are preferred for prolonged use because it has wider lumen & made of very inert material that does not

bubble after prolonged use, in contrast to silastic tubes
- use the safest, smallest silicon catheter that does the job
- use closed drainge system

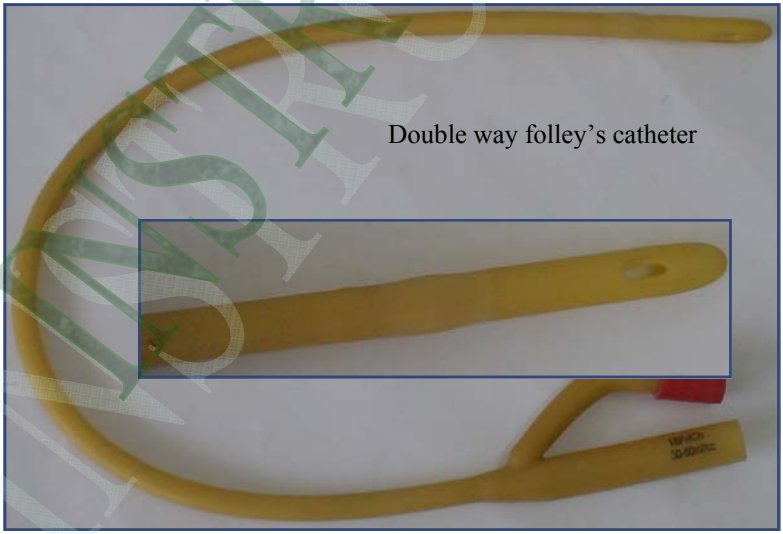

Triple way folley's catheter

Applications & Removal:

- Introduce by the same way as ordinary catheter
- Then fix by injection of saline or air according to the capacity of the balloon
- To remove, evacuate the balloon first by needle through the side channel

Complications:

- Urinary sepsis
- Urethral stricture


Double way folley's catheter

Malecot & De pezzar catheters

Description:

- Self-retaining catheters with expandable tips
- Made of rubber (red) or latex (yellow)
- They have wide diameter
- Malecot catheter has an umberella-like end
- De pezzar catheter has a mushroom-like end

Sizes:

According to French or English scales

Uses:

- As a nephrostomy tube after renal or pelvic operations
- Suprapubic drainge of UB (suprapubic cystostomy)
- Intercostal tube drainge for empyema, pleural effusion &/ or hemothorax
- As a feeding jejunostomy tube
- To drain amoebic liver abscess

Insertion & removal:

By stretching the catheter tip over a special wire called wire stretcher or introducer

Metal urethral catheter

Description:
- Metal tube
- Blunt closed end with two lateral openings at different levels
- With metal ring at the outer end, used to fix the catheter by silk sutures
- The male catheter is long & curved
- The female catheter is short & straight

Sizes:
According to French or English scales

Uses:
- Was used for urinary retention
- Not used nowadays because of their complications

Complications:
- Urethral rupture → false passage
- Catheter fever
- Catheter shock
- Urethritis

Male metal urethral catheter

Metal bougies or dilators

Description:

- Metal instruments of different sizes
- They are graduated
- Their thickness increases towards the handle
- The male instrument is curved at the tip

Sizes:

- The upper denominator indicates the diameter of the tip (in mm)
- The lower indicates the diameter of the base (in mm)

Uses:

- Dilatation of dilatable urethral strictures intermittently
- Dilatation of CBD stricture
- Dilatation of the ureter

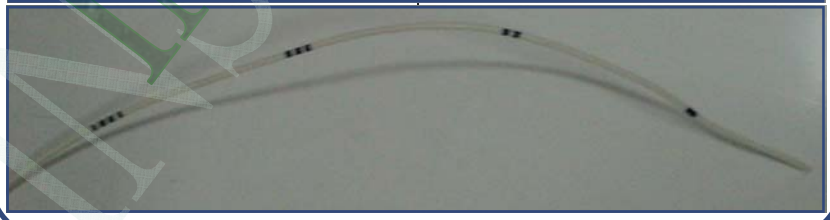
Ureteric catheter

Description:

- 75 cm long
- Yellowish in color
- Marked in centimeters

Uses:

- To perform retrograde pyelography
- To bypass, temporarily, ureteric obstruction (e.g. ureteric calculus)
- Split kidney function



Gum-elastic bougies

Uses:

- Dilatation of urethral stricture
- If the dtricture is tight, always start dilatation with the gum elastic bougies
- When No. 16F is reached, metal bougies can be used

Cystolithotomy stone forceps

Description:
- 2 handles one is ring-shaped & the other is U-shaped
- 2 expanded, grooved & guttered blades

Sterilization:
- Autoclave
- Boiling

Uses:
To remove stones from the urinary bladder

How to hold?
- The thumb is placed in the closed handle
- The rest of fingers are placed in the open handle
- The instrument is introduced vertically to remove large stones from the UB

Ureterolithotomy stone forceps

Description:

- 2 long handles
- 2 fenestrated blades, with a joint
- No ratchet
- The blades have serrations for better grip of the stone

Uses:

- To remove stones from the ureter
- To remove renal stones
- To remove stones from the UB

Nephrolithotomy forceps

Description:

The same as the uretrolithotomy forceps, but the blades have different curves

Uses:

- To remove stones from the renal pelvis in nephrolithotomy
- To remove stones from the renal calyces in pyelolithotomy
- To remove stones from the upper ureter

Crocodile forceps

Description:

- Two handles & two short jaws with long shaft
- The joint has an angle of about 120°
- The lower jaw is fixed & the upper jaw is mobile
- The inner surface of the jaws is transversely serrated

Uses:

Extraction of stones in the anterior urethra

Bladder sound

Description:

Resembles the metal bougie, but the caliber is uniform & the tip is more angled

Uses:

- Detection of stones in the urinary bladder when metalic click is felt
- It is not used nowadays

NB:

- Metal instruments that are introduced into the urethra or uterus to probe or dilate the passages are often called sound
- Sound = to prove or to try

Lithotrite

Description:
Long handle & two curved blades which are opened & closed by a wheel at the outer end

Uses:
Crushing of vesical stones

Indication:
Small, single, crushable stone, with no bladder or prostatic complications

Contraindications:
- Multiple stones
- Very large stone
- Stone in a diverticulum
- Cystitis or bladder tumors
- Prostatitis or prostatic tumors
- Narrow urethra
- urethritis
- Infants below 10 years

Complications:
- Rupture of the urethra
- Rupture of the urinary bladder
- Urethritis
- Cystitis
- Failure of crushing of stones

How to use?
- The bladder is first filled with water
- The lithotrite is introduced closed into the bladder
- Then it is opened & the stone is caught between the two jaws
- Then lock the jaws
- Move the instrument from side to side to make sure that the bladder mucosa is not caught
- The stone is then crushed
- Then remove the instrument and irrigate the bladder

Trocar & cannula

Sizes:
Different according to the indication

Sterilization:
- Autoclave
- Boiling

Uses:
- Introduction of catheters, as suprapubic cystostomy
- Insertion of chest tubes

How to use?
- Introduce the whole instrument through a small wound
- Introduce the instrument into the bladder
- Remove the trocar
- Introduce the catheter through the cannula
- Remove the cannula

Urine collecting bag

Other name:
Urine collecting bag

Description:
- It is provided already sterile.
- It is made of plastic.
- It is graduated for easy measurement of urinary output.
- It is provided with a valve for easy evacuation.

Uses:
I is attached to catheters & suprapubic tubes. to collect urine aseptically

Cystoscope

Uses:

- To examine the enterior of the bladder
- New generations are "catheterizing cysoscopes" which allows catheterization of the ureter & the introduction of instruments as biopsy forceps, diathermy electrodes & stone forceps

INSTRUMENTS OF ORTHOPEDIC SURGERY

Amputation shield & saw

Description:

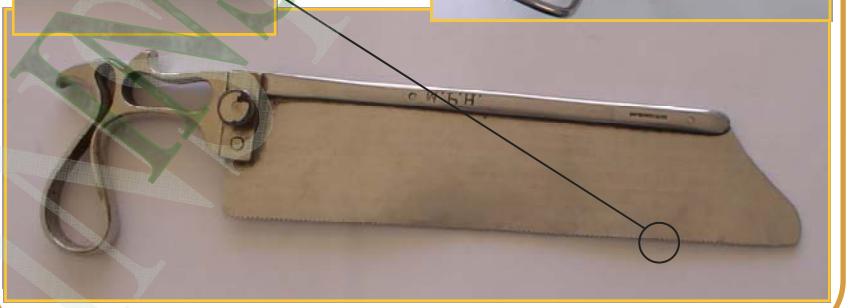
- Saw: Short handle & long serrated blade
- Shield: circular flap, that can be opened & closed, with a hole in the middle

NB:

It is replaced nowadays by electric saw

Uses:

- To divide bones during amputation.
- The shield is used to retract soft tissues while sawing of bones to prevent impregnation of muscles with saw dust



Osteotome

Description:
- Bulky handle
- Blade is beveled on either sides → makes only straight cuts

Sterilization:
- Autoclave
- Boiling

Uses:
To divide bones during osteotomy operations:
- McMurry osteotomy
- McEwen's osteotomy
- Osteotomy of bone tumors

Bone chisel

Description:
- Handle is bulky
- Blade is beveled on one side only → resists cutting along a straight path

Sterilization:
- Autoclave
- Boiling

Uses:
- Cutting slices of bones to be used as grafts
- Removal of exostosis
- Removal of osteophytes

Bone grafts are taken from:
- Tibia
- Fibula
- Ribs

NB:
- When the bevel is uppermost, it tends to angle vertically as it bites more deeply and becomes even more vertical and may split the bone.
- When the bevel is on the underside, its lip lifts a sliver of bone and tends to flatten and lies parallel with bone surface.
- Chisel from caedere = to cut

Bone gouge

Description:

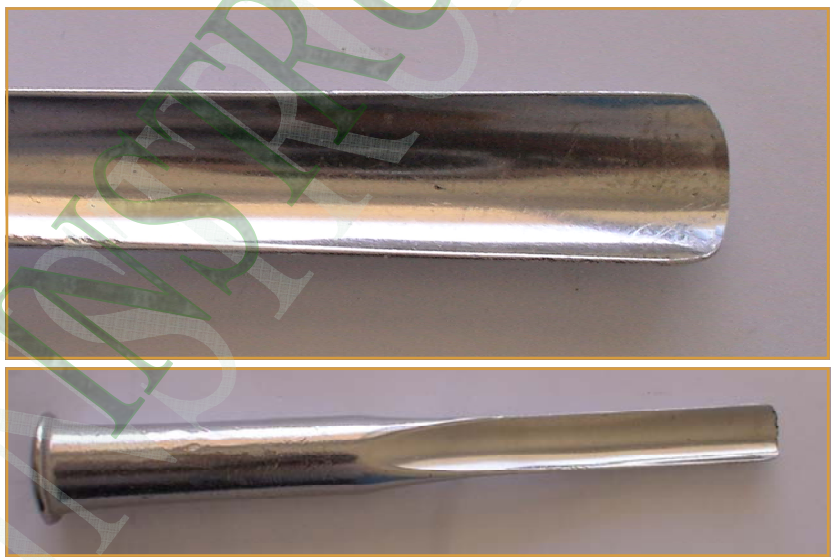
- Very bulky handle
- The blade is guttered
- It is beveled on the outer side → does not bite deeply

Sterilization:

- Autoclave
- Boiling

Uses:

To make a gutter in the bone as in ttt of chronic osteomyelitis to saucerise bone cavity



Bone lever

Description:
- Formed of a handle & a blade
- The blade is curved & may be serrated transversely

Sizes & shapes:
Variable, the biggest for example is used for the femur

Sterilization:
- Autoclave
- Boiling

Uses:
To elevate bones during internal fixation of fractures

Bone cutting forceps

Description:

- Very sharp blades
- Very strong handles
- Have one or multiple joints to increase the strength of the instrument

Sterilization:

- Autoclave
- Boiling

Uses:

- To divide small bones like phalanges of fingers & toes
- Cut bony processes of small sizes
- Circumcision

Bone holding forceps

Description:

- Heavy instrument
- Long handles
- Curved blades, which are supplied by teeth to increase the strength of the grip

Sterilization:

- Autoclave
- Boiling

Sizes:

Different sizes:

- Small sizes for small bones
- Large sizes for long bones

Uses:

Holding bones during orthopedic sugery

Sequesterectomy forceps

Description:
- Heavy instrument
- Long handle
- Short strong blade

Sterilization:
- Autoclave
- Boiling

Uses:
To hold & remove sequestrum during sequesterectomy

Bone nibbling forceps

Other name:
Bone rongeur

Description:
- Handle of different sizes & shapes
- Blade that is supplied by sharp cups
- It may be provided with 1 or 2 joints

Sterilization:
- Autoclave
- Boiling

Uses:
- To remove bony processes & fashion bones operated upon
- To obtain specimens from bone for histology.

Bone cutting forceps

Description:

- 2 cutting blades
- May be provided with one joint or 4 joints (to ↑ its strength)

Uses:

- to divide small bones (e.g. rib) and bony processes.
- It has a crushing effect on bone.
- The small one was also used in circumcision in infants (not used now).

Mallet (hammer)

Uses:

To hammer the osteotome, chisel or the gouge

Plate & screw

Uses:

Internal fixation of fractures of both bones (like the tibia & radius)

Plate bender

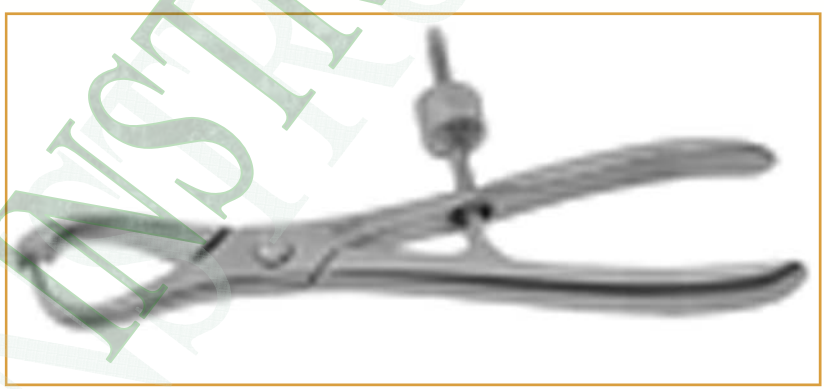
Uses:

2 of this instrument are used to shape the blate to fit the contour of the bone

Plate holding forceps

Uses:

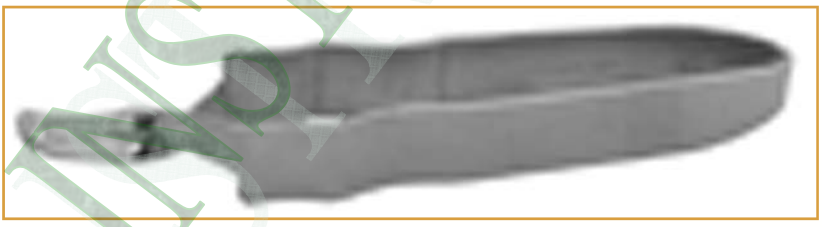
To fix the blat e during insertion of the screws



Screw holding forceps

Uses:

To steady the screw during its driving in



Screw driver

Uses:

- To drive the screw into the bone
- The bone should 1st be drilled

Plaster shear

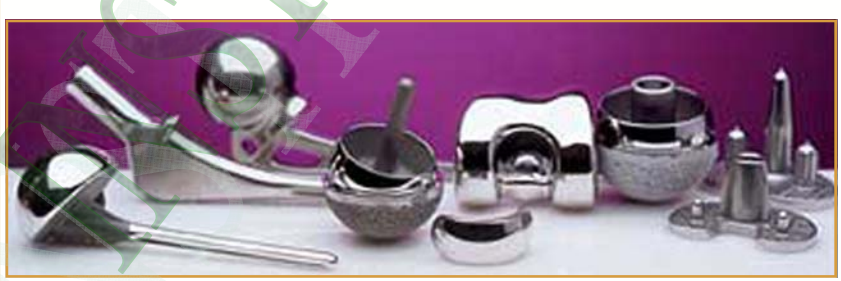
Uses:

To cut plaster cast

Osten moore head

Description:
Head, neck & shaft, resembling the upper end of the femur

Uses:
Used in hemiarthroplasty in cases of avascular necrosis of the head of femur due to fracture neck of femur



Periosteal elevator

Description:
The operating end is beveled on one side only

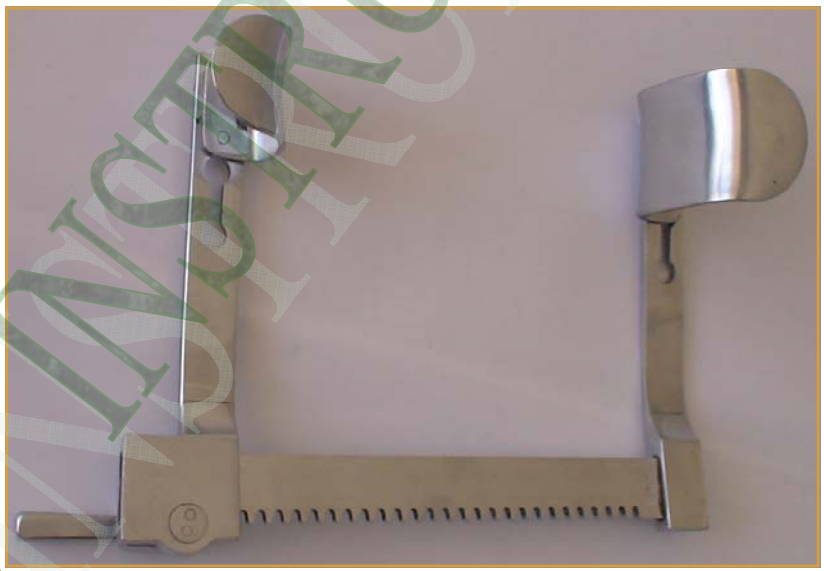
Use:
To elevate the superficial periosteum from the rib during rib resection

Finochetto rib spreader (retractor)

Description:
Self retaining retractor with a shaft & two blades

Sterilization:
- Autoclave
- Boiling

Uses:
Opening & closure of the chest (thoracotomy) operations for:
- Heart
- Lungs
- Trachea
- oesophagus



Rib approximator

Description:
A shaft & 2 short curved blades

Uses:
To approximate the ribs after finishing the operation of thoracotomy & to facilitate closure of the thoracotomy wound

Rib raspatory

Description:
- Bulky handle
- Straight or curved blade

Sterilization:
- Autoclave
- Boiling

Uses:
Elevation of the superficial & deep periosteum during rib resection in thoracotomy, empyema & renal surgeries

Rib shear

Description:

- 2 handles & 2 blades
- The handles are long & strong
- The blades are short, one is sharp & concave & the other is convex

Sterilization:

- Autoclave
- Boiling

Uses:

Cutting ribs in thoracic surgeries after separation of the periosteum

NB:

Rib resection instruments include:

- Periosteal elevator
- Rib raspatory
- Rib shear

Amputation knife

Description:
A handle & long very sharp blade

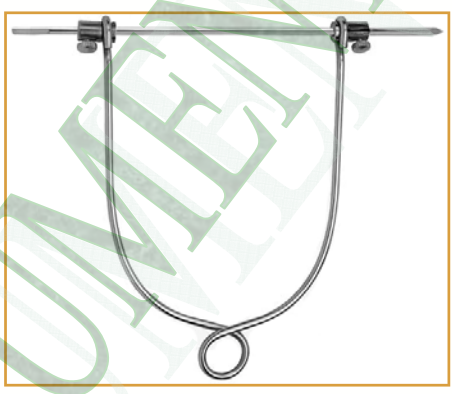
Uses:
To cut the muscles, vessels & nerves down to the bone with one sweeping motion called “tour de maître”

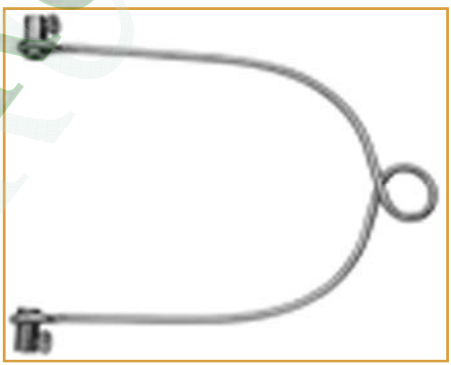
Steinmann's pin & stirrup

Description:
The pin is 4 mm thick

Uses:
Used in skeletal traction

Technique:
- The pin is drilled or hammered behind tibial muscles
- The stirrup is fixed & traction is applied through the stirrup





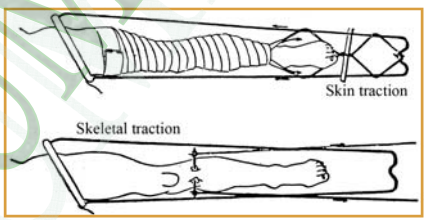
Thomas knee splint

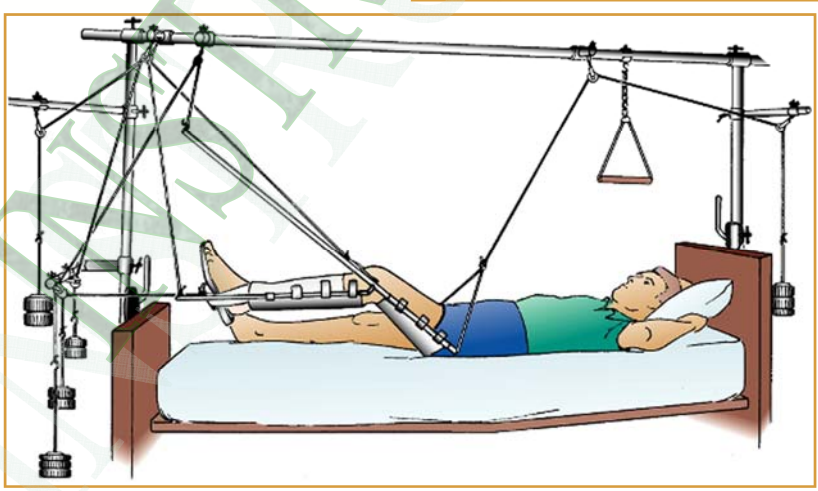
Description:

- Ovoid ring padded with felt and covered with leather
- Two iron bars continuous at the other end
- The ring is oblique and has a notch posteromedially where it presses against the ischial tuberosity to provide counter traction if needed
- It can be provided with a flexion piece, which hinges on the bars opposite the knee

Uses:

- First aid treatment of fractures of the lower limb.
- Fixation of the knee in the treatment of tuberculous knee joint.
- Treatment of fractures of the femur by skin traction
- Skletal traction.

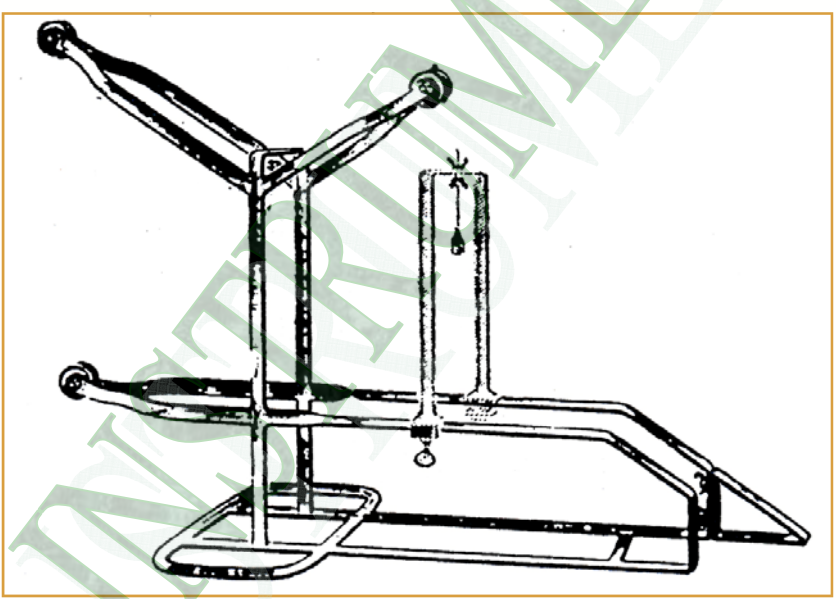




Bohler's splint

Uses:

Treatment of fractures of the femur & tibia by skeletal traction



Cramer's wire

Uses:

It provides temporary splint

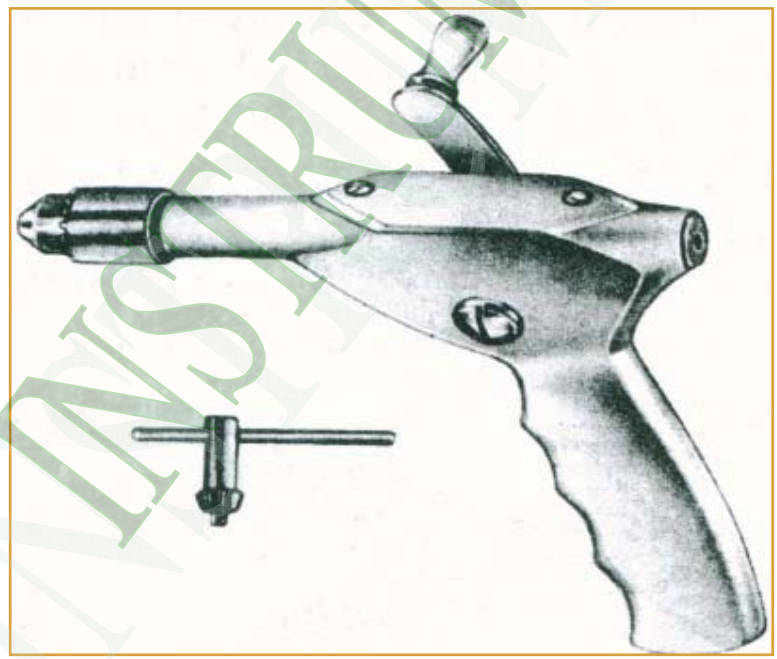
Hand drill

Uses:

It is used to make drill holes for plate fixation and for fixation of fracture of the mandible, olecranon and patella.

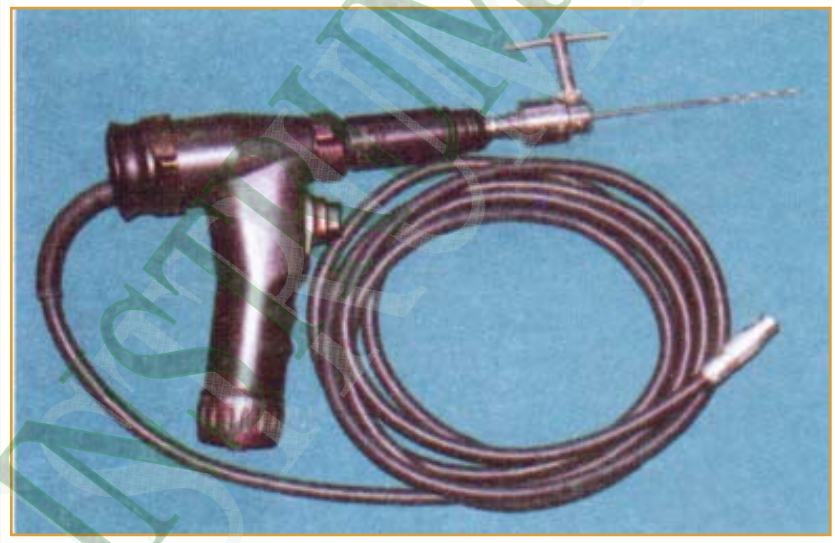
NB:

It may be difficult to start the hole especially on rounded, hard, cortical bone, without first making a preliminary notch with an awl.



Powered drill

This is now routinely employed. It creates heat and the bit should be cooled with cold, sterile, physiological saline and prolonged periods of continuous drilling should be avoided



NEUROSURGICAL INSTRUMENTS

Mastoid self retaining retractor

Other names:
- Weitlaner retractor
- West retractor

Description:
- 2 handles & 2 curved blades
- It has 3-4 small hooks on each blade
- It has a lock

Uses:
- Retraction of the soft tisuues after elevating the periosteum in mastoidectomy
- Retraction of the edges of the scalp wound during operations on the skull & brain

Hudson's brace, perforator & Burr

Nomenclature:
- Brace= used for turning
- Burr= used for making a wide hole
- Perforator= used for making a small hole

Description:
Heavy instrument with a handle, brace, perforator & drill (burr)

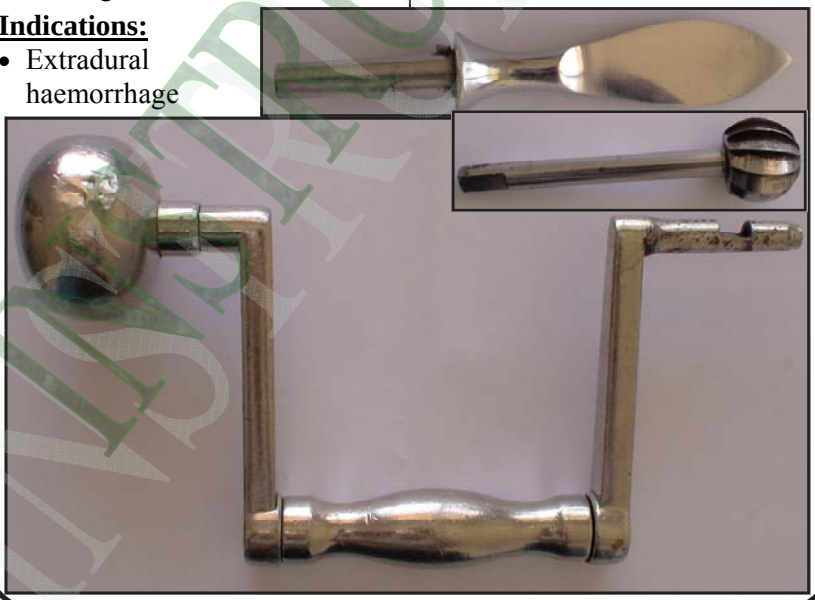
Uses:
- To make a hole & burr in the skull in trephine operations

Sterilization:
- Autoclave
- Boiling

Indications:
- Extradural haemorrhage
- Subdural hematoma
- Operations for brain tumors
- Evacuation of brain abscess
- Taking biopsies

How to use?
- Apply the perforator
- Rotate the handle until a funnel shaped hole is made in the skul
- Replace the perforator by the burr
- Rotate the burr until the bone is completely perforated

Value:
It is safer than trephine



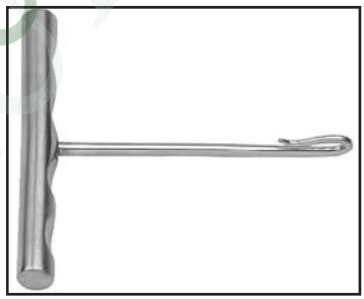
Gigli wire saw & handle

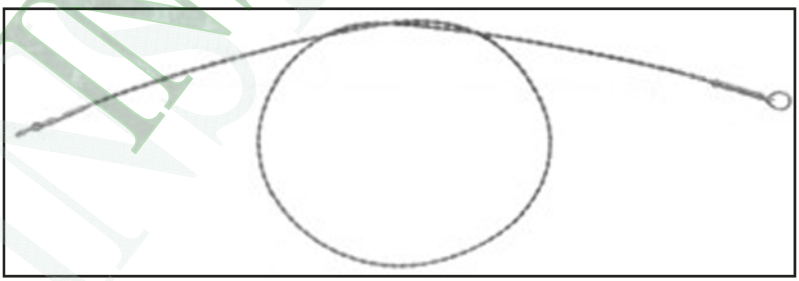
Description:
- Serrated wire
- Each end of the wire can be fitted to a special handle

Uses:
Elevation of osteoplastic flap from the skull through 2 burr holes

How to use?
- Made burr holes at the margins of the desired flaps
- Separate the dura
- Introduce the guide between 2 burr holes
- Thread the saw over the guide
- Divide the bridge between the 2 holes

Value:
- It allows cutting bone in small spaces
- It doesn't damage soft tissues





Laminectomy roungeur

Description:

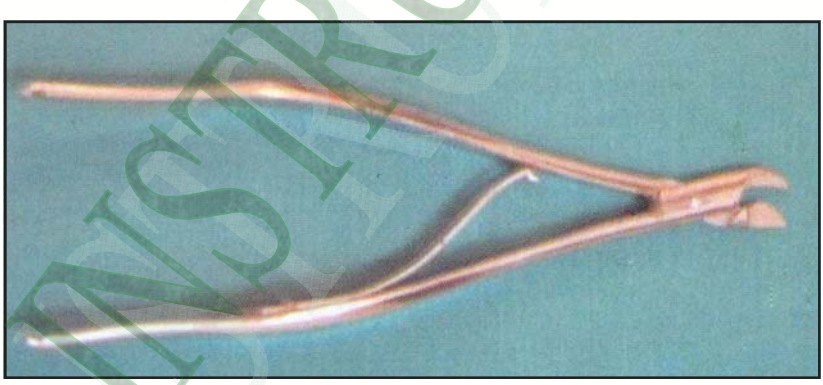
- Bone nibbling forceps
- It has 4 joints

Uses:

Excision of laminae during laminectomy

Skull roungeur

Uses:
Widening trephine & burr holes



Dura separator

Description:
A handle & a blade that is curved to fit the convexity of the dura

Uses:
To separate the dura from the bone

VASCULAR INSTRUMENTS

Mayo's vein stripper

Description:

- Long metal malleable wire
- One blunt end with different sizes
- The other end has a removable T-shaped handle

Uses:

Stripping of long or short saphenous veins in cases of varicose veins

How to use?

- Open the two ends of the vein to be stripped
- Introduce the stripper from above (better)
- Tie the vein to the wire at its tip
- Apply the tip & the handle and pull the instrument strongly

Indications:

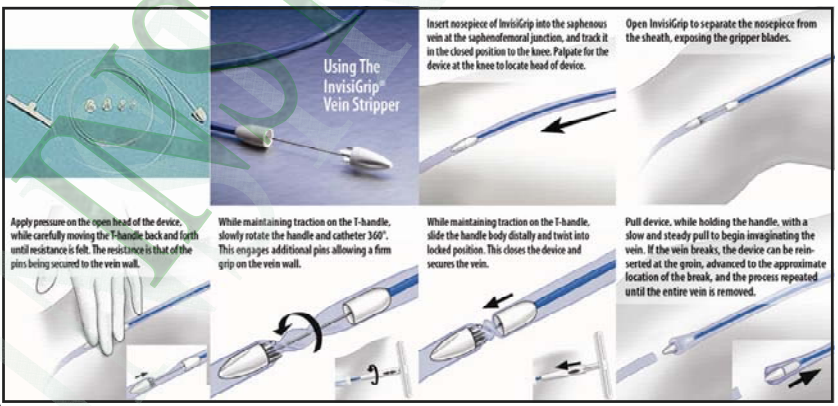
- Symptomatic varicose veins
- Primary complicated varicose veins

Contraindications:

- 2ry varicose veins
- Acute thrombophlebitis
- History of DVT or pulmonary embolism

Complications:

- Rupture of collaterals with subcutaneous haemorrhage
- Injury of saphenous nerve



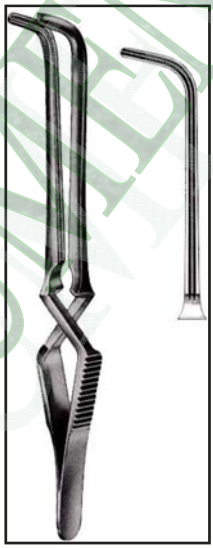
Bulldog clamp

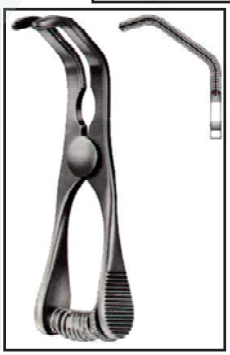
Description:

- Two handles & two blades
- The handles are attached by special spring joint
- The blades have transverse serrations
- The blades are separated when the shafts are approximated

Uses:

- Occlusion of arteries during direct arterial surgery: eg. arterial anastomosis, thromboendarterectomy & arterial grafting
- Its function is to prevent bleeding





Vena caval clamp

Other name:
Satinesky clamp

Description:
Like artery forceps, but the blades are strong & S-shaped

Uses:
- Isolation of part of the wall of the vena cava during porto-caval shunt operations
- Occlusion of the renal pedicle during nephrectomy
- Occlusion of the portal vein during hepatectomy or hepatic transplantation

Vascular clamps

Description:

- Like artery forceps, but larger & stronger
- They are of different angles

Types:

- Debakey vascular clamp
- Pollock Aortic clamp

Uses:

Occlusion of arteries during surgery, without crushing their walls

Right-angled Clamp

Other name:
Lahy's clamp

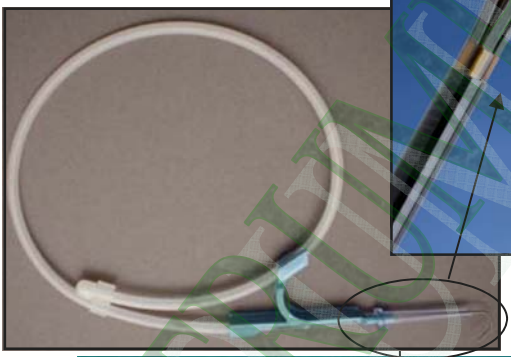
Description:
Long instrument with right angle at the operating end

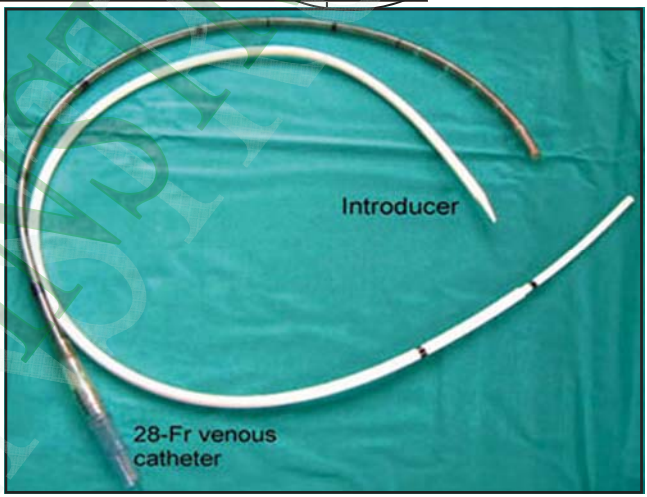
Uses:
Ligating the major vascular pedicle such as: superior thyroid pedicle, cystic artery (cholecystectomy) & lumbar veins (lumbar sympathectomy)

Venous catheter

Description:

Long catheter with guide wire inside





Fogarty catheter

Description:

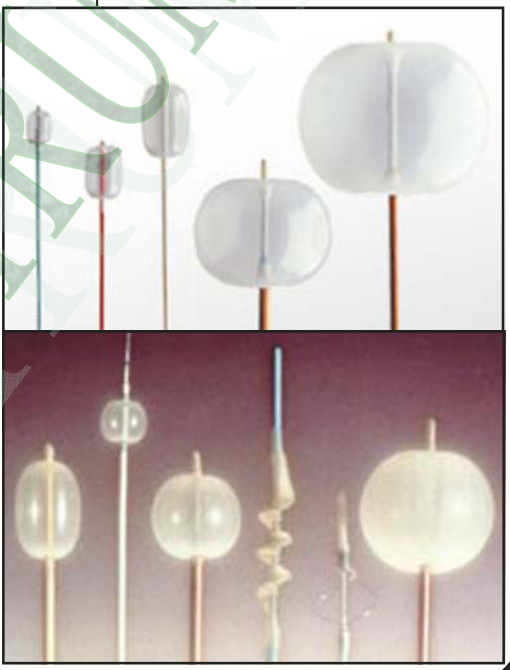
- Fogarty catheter is like a ureteric catheter, with a balloon-tip
- It has a guide wire inside.
- made of plastic
- may be of any colour.
- Its length is 80 cm.

Uses:

- Fogarty catheterization is the most effective method of removing proximal and distal extension thrombus
- allows an embolus or thrombus to be removed from a vessel away from arteriotomy.
- It is also used for CBD stone removal.

Fogarty catheterization:

- The catheter is introduced (via an arteriotomy in the common femoral artery in the groin) until it is thought to have passed the site of the thrombus.
- The balloon is inflated
- the catheter is withdrawn slowly, together with the clot.
- The procedure is repeated until bleeding occurs.
- Long-term anticoagulation with warfarin should be used to reduce the chance of further thrombus formation.



Aneurysm needle

Description:

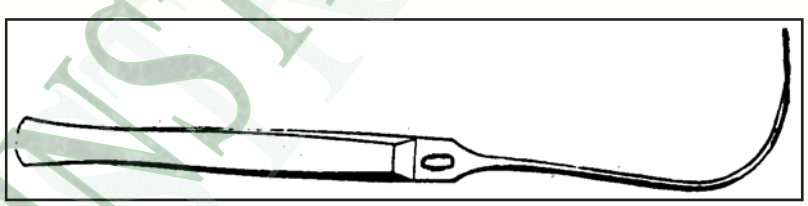
- Handle
- Curved blunt pointed blade
- There is a hole at the tip or at the junction between the handle & the blade

Uses:

To pass a ligature around blood vessels

NB:

- It is called aneurysm needle because it was used to ligate the feeding artery of an aneurysm
- It is of a limited use in aneurysm nowadays



OTHER INSTRUMENTS

Duval's lung forceps

Description:

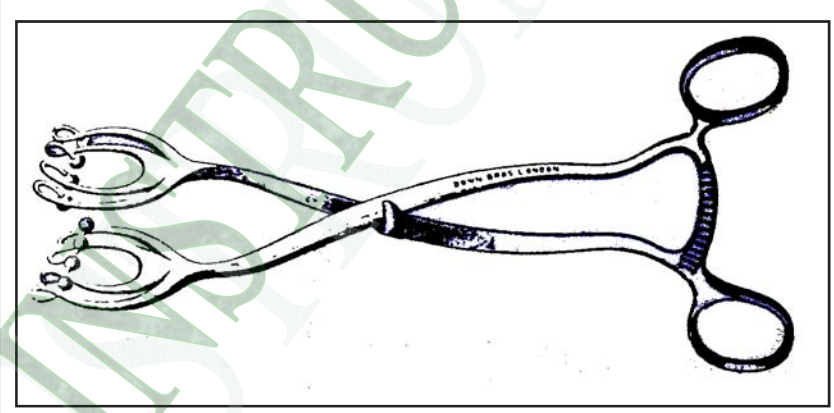
- 2 handles & 2 blades
- The blades are long with triangular fenestrated ends

Uses:

It is a lung grasping forceps.

Friedrich's lung forceps

Uses:
Tissue forceps for the lung



Oropharyngeal Airway

Description:

This is a curved rigid tube which, when inserted, follows the curvature of the tongue pulling the tongue and the epiglottis away from the posterior pharyngeal wall and providing a channel for air passage.

Uses:

To prevent the tongue and epiglottis from falling back against the posterior pharyngeal wall in anaesthetized patients.

Face mask

Uses:

- facilitates delivery of anesthetic gas from a breathing circuit to a patient by creating an airtight seal with the patient's face.
- The black rubber masks are pliable enough to adapt to uncommon facial structures.

Metal tracheostomy tube

Description:

- 2 tubes; inner long & outer short metal tubes
- No cuff

How to use?

- Introduce the tube through the tracheostomy opening
- Pass a tape around the neck, then in the opening & tie it to keep the tube in place
- If the tube is blocked, the inner tube is removed, cleaned & reintroduced

Cuffed tracheostomy tube

Description:

- Single cuffed tube
- Made of polyvinyl chloride (PVC)

Value:

- The cuff prevents leakage of the air
- It also prevents acid aspiration syndrome (Mendelson's syndrome)

How to use?

- Introduce the tube into the trachea as above
- Inflate the cuff by 3-4 mL of air

Central venous catheters

Description:

- This is a double lumen catheter with insertion guide wire.
- The catheter length is 20 cm.
- There are two clamps for temporary control of each lumen and caps for sealing.

Uses:

Medium or long-term venous access, for:

- Measurement of the central venous pressure
- Parenteral feeding
- injection of chemotherapeutic agents.

Technique of internal jagular catheterization:

- A line is drawn between the mastoid process and the sternoclavicular joint.
- The carotid artery is palpated on this line and the internal jagular vein lies immediately lateral to it at the midpoint of this line. The head down position is used to prevent air being sucked in and to distend the vein.
- A 7 cm needle, mounted on a syringe, is inserted caudally at 45 degrees to the vertical into the internal jagular vein.
- The syringe is removed and a Seldinger wire is passed through the needle into the vein.
- The needle is removed and the catheter is placed over the wire and is passed into the vein.
- The wire is removed and the catheter sutured into position and covered with a sterile, transparent, self-adherent dressing.
- The catheter tip should be positioned in the inferior vena cava or right atrium (confirmed radiologically).
- Complications include pneumothorax, haemothorax, brachial plexus and phrenic nerve injury and carotid artery perforation.

Swan-Ganz catheter

Description:

- The pulmonary artery catheter is a balloon-tipped catheter
- made of polyvinyl chloride
- 110 cm long.
- Its lumen includes the following:
  - ◊ Wiring to connect the thermistor near the catheter tip to a thermodilution cardiac output computer.
  - ◊ Right atrial port, 30 cm from the tip for infusions, cardiac output injections and measurement of right atrial pressures.
  - ◊ Ventricular port, 20 cm from the tip for infusion of drugs.
  - ◊ Pulmonary artery port for aspiration of mixed venous blood samples and measurement of pulmonary artery pressure.
  - ◊ Balloon port for inflation of the balloon.

Uses:

- To differentiate between left and right ventricular failure, pulmonary embolus, septic shock and ruptured mitral valve.
- Accurate guide to therapy with fluids, inotropic agents and vasodilators.
- To measure cardiac output by a thermo-dilution technique simply at the bedside.

Technique

- The technique of passing the catheter is the same as for central venous catheterization.
- The balloon is inflated with 1.5 ml of air and advanced slowly via the right ventricle into the pulmonary artery, checked by x-ray and monitored by pressure tracings, which become characteristically flat when the balloon wedges in a small branch to give the capillary pressure (indicating left atrial pressure).
- When the balloon is deflated, the pulmonary artery pressure is obtained. The balloon must never be reinflated in the absence of a normal pulmonary artery waveform as this means that the tip alone is wedged and reinflation might therefore rupture the pulmonary artery. Withd-rawal of 2-3 cm is mandatory until the wavef-orm reappears and reinflation can be permitted.
- The catheter should not be left in situ for more than 72 hours.
- Complications include arrhythmias, pulmonary infarction, pulmonary artery rupture and catheter knotting.